

*Attorney Docket No.: EMC-99-027DIV1
Applicant: Preston F. Crow et al*

REMARKS

In response to the Office Action mailed July 27, 2005, the applicants respectfully request reconsideration. In the Office Action, claims 16-20 and 26-28 were rejected and claims 21-25 were indicated as being allowable. By this amendment, claim 26 has been amended. Claims 16-28 remain pending in this application.

Rejection of Claims Under 35 U.S.C. §103

Claims 16-20 and 26-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Pub. No. US: 2004/0133570 A1 of Soltis in view of US Patent No. 4,761,737 to Duvall.

Applicant asserts that this rejection, as applied to claims 16-20, has already been presented by the examiner, argued against by the applicants and presumably withdrawn by the examiner. In the Office Action mailed June 29, 2004, the examiner rejected claims 16-25 as being unpatentable over US Patent No. 6,697,846 to Soltis in view of US Patent No. 4,761,737 to Duvall.

In applicants' response dated October 29, 2004, applicants presented arguments against the rejection to support applicants' position that the claims were allowable over the combination suggested by the examiner. The claims were not amended in that response.

In the next Office Action, the only rejection of claims 16-25 presented by the examiner was a double patenting rejection of claims 16 and 21 over claim 1 of applicants' US Patent No. 6,654,772. There was no mention of the previous 35 U.S.C. §103 rejection. Accordingly, this indicated to the applicants that the 35 U.S.C. §103 rejection of claim 16-25 had been overcome and withdrawn. Applicants responded to the Office Action with the filing of a terminal disclaimer.

Applicant asserts that the 35 U.S.C. §103 rejection of claims 16-20 is exactly the same as the rejection in the June 29, 2004 rejection, which applicants assert was overcome in the response of October 29, 2004. While a different document has been cited in the present rejection, it contains the exact subject matter as the patent cited in the June 29, 2004 rejection. The publication document 2004/0133570 A1 of Soltis is the

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publication of a continuation of US Patent No. 6,697,846 to Soltis. Accordingly, the subject matter in the publication document is identical to the subject matter in the patent. A comparison of the June 29, 2004 Office Action and the present Office Action show that the rejections are essentially the same, save for the citation of paragraphs in the published document rather than columns and lines in the patent. Since the claims have not been amended, applicants assert that the arguments presented in the October 29, 2004 response address the rejection.

Applicants' independent claim 16 recites a memory storage system having devices organized in physical data blocks for physical storage of data and at least one processor including an operating system having an extent based file system for abstracting file names to the physical data blocks in the devices by assigning an inode to each file. Each inode is adapted to store extents having a field to point to a logical volume. At least two of the extents are direct extents indicating a logical volume containing data blocks. A first direct extent points to first data blocks in the data storage devices and a second direct extent points to second data blocks in the data storage devices. The first direct extent indicates a different logical volume than a second direct extent.

The Soltis reference discloses a file storage system suitable for providing users and applications with access to shared data found on storage devices attached directly to shared data found on storage devices attached directly to a network. The file system uses layering techniques to inherit file management functionality from existing systems. Metadata is stored and shared among multiple computers by storing the meta-data as real-data in regular files of a standard client-server distributed file system. The name space consisting of inode files stored as real-data on the meta-data server acts as the name space for the shared data and file attributes of the inode files are utilized as the file attributes of the shared data. (Soltis, Section 0038 and Abstract). However, Soltis does not teach or suggest any extent-based method for striping the data from a single file on a single system across multiple logical volumes nor does he show or suggest in any way that two direct extents in a single inode can be used to indicate different logical volumes from one another.

Applicants' respectfully disagree that Soltis teaches a system that each inode adapted to store extents having a field to point to a logical volume. Within any Soltis

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inode, only one logical volume is directly addressed. Several NAS storage devices form a logical volume to comprise a single, logical device (Section 0073). However, he teaches and shows in his Fig 5 that the data blocks for each file must reside on a single logical volume. Each inode file maintains information pertaining to a single SFS regular file stored on an NAS device (Section 0078). Soltis shows that SFS partitions logical NAS devices into multiple segments in order to exploit parallelism in the network environment (Section 0076). Soltis also shows that all the list extents contained in an inode or set of inodes containing a file indicate physical data blocks in a single logical volume (Sections 0078-0079). It is the physical data blocks themselves, not the extents in the inodes, which may contain pointers to a second logical volume, and even there, all of the pointers contained in the blocks of the first logical volume are all shown pointing to blocks in one single second logical volume, not split among multiple logical volumes. (Sections 0078-0079). In other words, Soltis only teaches that all the pointers in one inode can point to one logical volume and all the pointers in another inode can point to a second logical volume (Soltis, Section 0076).

Applicants respectfully agree with the Examiner that Soltis does not teach having devices organized in physical data blocks for physical storage of data and at least one processor including an operating system having an extent based file system for abstracting file names to the physical data blocks in the devices and at least two of the extents being direct extents indicating a logical volume containing data blocks, a first direct extent pointing to first data blocks in the data storage devices and a second direct extent pointing to second data blocks in the data storage devices, the first direct extent indicating a different logical volume than a second direct extent. Applicants respectfully point out that, because of this, Soltis cannot and does not teach or suggest any extent-based method for striping the data from a single file on a single system across multiple logical volumes nor does he show or suggest in any way that two direct extents in a single inode can be used to indicate different logical volumes from one another. These are the problems solved by Applicants' invention. Applicants' claim 16 recites that Applicant's inode contains at least two direct extents indicating a logical volume containing data blocks in which segments of a single file are stored, and that the first direct extent indicates a different logical volume than the second direct extent. This

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feature of Applicants invention is illustrated, for example, in Applicants' Fig 5 and described, for example, at page 7, lines 3-18 of the present disclosure where it is indicated that each direct extent may indicate a logical volume, that the various extents of each inode may map to data blocks of different logical volumes, and these extents may map different segments of a single abstract file to different ones of the drivers and to different physical disks and partitions thereof.

The deficiencies of Soltis with respect to Applicants' invention are not overcome by Duvall. The Duvall reference discloses a UNIX file system managed in a virtual machine environment. Duvall's system manages the allocation of virtual address space in the system.

Applicants' acknowledge that Duvall does teach data block addresses and plurality of sequence of blocks, (col. 2, lines 53-68) and Applicant's also acknowledge that Duvall discloses an inode structure (col. 2, lines 62 -67 and col. 3, lines 1-6). However, Duvall does not teach or disclose the logical volume concept. Indeed, the invention in Duvall involves the use of a map page range service for mapping files directly to a physical address (col 7, lines 10-68, col 8, lines , col 19, lines 60-68, col 20, lines 1-40). Thus, Duvall does not teach, disclose or suggest any provision for writing different direct extents to addresses in different logical volumes, as discussed in Applicant's description and specifically recited in Applicant's claims 16 and 21. Nor does Duvall teach, disclose or suggest any reason for such assignment. Thus, Duvall cannot teach, disclose or suggest any inode in which a first direct extent specifies a first logical volume and a second direct extent specifies a second logical volume.

Applicants respectfully submit that, even if Soltis and Duvall were combined, neither of the two, alone nor in combination, teaches or suggests Applicants' invention as described in claim 16. There is no suggestion in either reference of how extents within a single inode could map to multiple logical volumes. It remained to Applicants to invent a solution to this problem. Moreover, since Soltis teaches file management in a distributed, shared file system in a client-server environment and Duval teaches memory management in system using virtual memory, there would be no reason to combine the two references, or to apply either of them to data management. Applicants respectfully submit that claim 16 is allowable.

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Since claims 17 - 20 depend from claim 16, applicants assert that these claims are allowable for at least the same reasons as independent claim 16.

Regarding claim 26, the examiner states that the combination of Soltis and Duvall teach the invention recited in independent claim 26.

While applicants disagree with the examiner's position and assert that claim 26 is allowable over the combination relied upon by the examiner, applicants have amended claim 26 to indicate that the at least one extent written to the third physical data block points to a fourth physical data block storing a segment of the file. The language of claim 26 corresponds with the language set forth by the examiner in Section 9 of the Office Action as indicating allowable subject matter. Accordingly, applicants assert that amended independent claim 26 is allowable over the art of record.

Since claims 27 and 28 depend from amended independent claim 26, applicants assert that these claims are allowable for at least the same reasons as independent claim 26.

Applicant acknowledges and appreciates the indication that claims 20-25 are allowable.

Based on the foregoing, applicants respectfully assert that claims 16-28 are allowable over the art of record and respectfully request that a timely Notice of Allowance be issued in this application.


In the event the Patent Office deems personal contact desirable in disposition of this matter, the Office is invited to contact the undersigned attorney at (508) 293-7835.

Please charge any fees occasioned by this submission to Deposit Account No. 05-0889.

10/31/05

Date

Respectfully submitted,



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